



1999

Storage Field Inventory Report

(Fall 1998-Spring 1999 Cycle)

Reservoir Engineering and
Geology Department
December, 1999

ANR Pipeline Company Storage Fields

EXECUTIVE SUMMARY

Reservoir Engineering and Geology (RE&G) met with consulting engineers Messrs. Dowdle and Elenbaas on December 2-3, 1999 to review the annual inventory verification study of the owned storage fields. As with past reviews, any operational changes which have influenced reservoir performance or affected growth patterns were discussed, along with the methodologies used to analyze this data.

The Capac field 1998-1999 non-effective gas volume is 7,549 MMcf, which is higher than average. The high non-effective volume results from a combination of high fall 1998 volume (38.2 Bcf total gas-in-place to 0 psia), relatively low withdrawal volume (net of only 10.9 Bcf), and short shut-in periods (five days in fall 1998 and 17 days in spring 1999). Application of pressure stabilization techniques suggests that virtually all of the gas content can be verified. Overall, the storage operations are stable and are not resulting in loss of gas, although some impoundment of gas is occurring in the north and on the edges of the field. Gas impounded in these areas is recoverable, and Capac's non-recoverable gas volume remains at 0 Bcf.

The 1998-1999 non-effective gas volume for Central Charlton is 550 MMcf, a slight increase relative to previous years due to balance adjustments and short shut-ins. Additional pressure stabilization would reduce the unverified volume to around 0.2 Bcf. One ongoing operating concern at Charlton (and South Chester) is the CO₂ content of injection gas. A plan has been developed to control the CO₂ level by blending lower CO₂ gas from Great Lakes' pipeline with higher CO₂ Antrim gas to achieve an average injection composition of 1.25 mol. pct. CO₂ or less. Withdrawals of only 3.6 Bcf were required from Charlton during the 1998-1999 winter, the second consecutive year of moderate use of the field.

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Muttonville's 1998-1999 non-effective gas volume is 238 MMcf, a typical value; with additional pressure stabilization, all the gas content to 0 psi is verified, although 0.1 Bcf is considered non-recoverable due to the difficulty in producing the gas below atmospheric pressure. No new information has become available in the past year from the Pilat 1-24 well on an offset reef. Due to the nature of the TransCanada contract storage service provided from Muttonville, several withdrawal and injection periods now occur throughout a 12-month period. During the past cycle, I/W activity occurred at Muttonville in every month except February and April.

The 1998-1999 non-effective gas volume in South Chester is 516 MMcf, which is less than the historical average. Additional pressure stabilization reduces the non-effective volume to approximately 0.2 Bcf. The non-recoverable volume at Chester remains 0.3 Bcf. As with Charlton the CO₂ content of injected gas will be limited to an average of 1.25-1.5 mol. pct. by blending Antrim production gas with Great Lakes pipeline gas.

Winfield's 1998-1999 non-effective gas volume is 900 MMcf, within the range of values over the past nine cycles. Additional pressure stabilization reduces the non-effective volume to around 0.1 Bcf. Although the reservoir is slowly expanding in response to average annual pressures of 70-80 psi above discovery pressure, the gas is confined in the geologic structure and all the content is verifiable. Thus, the non-recoverable volume remains 0 Bcf at Winfield.

The 1997-1998 non-effective and non-recoverable (by both abandonment and pressure decline analyses) gas volumes for owned fields are listed in Table 1 which follows.

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1998 KATZ REPORT										1998-1999 INVENTORY REPORT										
FIELD	NON-EFFECTIVE					NON-RECOVERABLE					NON-RECOVERABLE					NON-RECOVERABLE				
	GAS	BY PDA	BY AA	OF ORIGINAL	% PORE VOLUME	BY PDA	BY AA	OF ORIGINAL	% PORE VOLUME	BY PDA	BY AA	OF ORIGINAL	% PORE VOLUME	BY PDA	BY AA	OF ORIGINAL	% PORE VOLUME	BY PDA	BY AA	
CAPAC	7.55	0	0	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
C. CHARLTON	0.55	N/A	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MULTONVILLE	0.24	0	0	100	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	
S. CHESTER	0.52	N/A	N/A	N/A	0.52	0.52	0.52	0.52	0.52	0	0	0	0	0	0	0	0	0	0	
WINFIELD	0.90	0	0	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	
97	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	
N/A: DATA NOT AVAILABLE FOR FIELDS DEVELOPED FOLLOWING KATZ REPORT.																				

1999 STORAGE FIELD INVENTORY STATUS
1998 KATZ REPORT
VOLUMES IN Bcf

TABLE 1

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January 10, 2000

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INTRODUCTION

CAPAC

CENTRAL CHARLETON

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INVENTORY REPORT
OF
ANR PIPELINE COMPANY
OWNED STORAGE FIELDS
(FALL 1998 - SPRING 1999)

INTRODUCTION - PURPOSE

ANR Pipeline's Reservoir Engineering & Geology Department is charged with the responsibility of conducting an annual storage gas inventory study of the storage fields. The purpose of the study is to verify the stored gas volumes recorded on the Company books, and assess the impact of any changes made in the operation of the storage fields. The purpose of this report is to present the results of the inventory study for the 1998-1999 injection/withdrawal cycle.

GENERAL

As of January 13, 1999, ANR Pipeline transferred ownership of the Coldwater and Croton storage fields to Mid Michigan Gas Storage Company, abandoning the use of these two fields in interstate gas transportation and storage service. ANR Pipeline Company owns five storage fields, with a 1998 working gas capacity of 73.6 Bcf and a base gas volume of 26.96 Bcf. As of December 31, 1998, there were 217 active injection/withdrawal wells (including two saltwater disposal wells in Capac) and 20 observation wells. Table 1 lists the volume of base and working gas, discovery year, storage activation year, and the number of injection-withdrawal and observation wells for each owned storage field. A summary of storage field statistical data on Table 2 provides pertinent information on each field, including discovery pressure, initial reserves, base gas volumes, and reservoir depth and temperature.

INVENTORY REPORT - OWNED FIELDS - PAGE 2 of 2

At the end of the withdrawal period covered in this, the 1998-1999 Inventory Report, ANR Pipeline gas operations made adjustments to the working gas and base gas volumes in each field as per FERC certification. Table 3 illustrates the volume of working gas transferred to base gas and the new volume classification, by field, which will appear in future Inventory Reports, beginning with the 1999-2000 report. For these five fields, a total of 20.8 Bcf was transferred from working to base, and maximum working content was reduced to a total of 52.8 Bcf.

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GENERAL FIELD INFORMATION												
FIELD	DISCOVERY	YEAR	ACTIVATION	STORAGE	OWNED STORAGE FIELDS							
					WELLS	BASE GAS	WORKING GAS	FALL 1995	WORKING GAS	FALL 1996	WORKING GAS	FALL 1997
Capac	1961	1978	95(c)	6	12.22	21.0	20.3	20.8	22.0	22.0	16.3	11.1
C. Charlton	1975	1982	9	1	2.70	2.31	15.4	15.6	15.9	16.0	16.3	11.1
Muttonville	1966	1975	17	1	2.70	2.66	11.1	11.1	10.8	11.1	11.1	11.1
S. Chester	1970	1980	7	1	2.31	1.1	16.3	16.8	16.5	16.8	16.8	16.8
Winfeld	1935	1951	89	2	2.66	11.1	11.1	11.1	10.8	11.1	11.1	11.1
(a) Maximum working gas volume stored during storage cycle for individual field.												
(b) Volumes reflect base gas down to estimated BHP/Z abandonment pressure for each field listed on Table 2.												
(c) Includes two saltwater disposal wells.												

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ANR PIPELINE COMPANY OWNED STORAGE FIELDS STORAGE FIELD STATISTICAL DATA											
FIELD	DISCOVERY				ABANDONMENT						
	WHP (psig)	BHP (psia)	BHP/ 2 (psia)	BASE GAS BELOW TOTAL INITIAL GAS IN PLACE MMcf (@ 14.73)	BASE GAS BELOW ABANDONMENT PRESSURE (MMcf)	BASE GAS *** (MMcf)	DEPTH (ft.)	RESERVOIR TEMPERATURE (°F)	AVERAGE RESERVOIR PRESSURE FROM BHP/Z	RESERVOIR DEPTH	AVERAGE RESERVOIR PRESSURE FROM BHP/Z
Capac	1,324	1,530.0	1,900.5	230.5	32,749	3,973	12,220	4,500	89	105	74
C. Charlton	2,545/	2,322**	2,940.0	4,108.0	0.0	17,600	0	2,700	5,750	6,500	113
Multonville	1,217	1,331.0	1,625.2	4,178.1	0.0	10,715	0	2,314	2,700	2,655	6,130
S. Chester	2,691/	*2,326**	3,103.0	4,178.1	0.0	18,006	0	2,314	2,700	2,655	6,130
Winfield	446	446	475.0	514.0	66.6	11,196	1,455	7,074	1,120	61	61

*** Base gas per company blocks.

** First number is equivalent discovery pressure using .576 gravity injection gas, second number is discovery pressure w/native fluid.

* Pressure estimated due to blow-out at discovery.

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TABLE 3

GAS VOLUME TRANSFERRED FROM WORKING TO BASE,
AND REVISED TOTAL BASE GAS AND MAXIMUM WORKING GAS CONTENT

FIELD	VOLUME OF WORKING GAS TRANSFERRED TO BASE GAS (Bcf)	REVISED CONTENTS			
		BASE GAS ABOVE ABANDONMENT PRESSURE (Bcf)	BASE GAS BELOW ABANDONMENT PRESSURE (Bcf)	TOTAL BASE GAS (1) (Bcf)	MAXIMUM WORKING GAS (Bcf)
Capac	8.4	20.620	3.973	24.593	13.6
C. Charlton	3.9	6.600	0	6.600	12.4
Muttonville	2.9	5.214	0	5.214	8.2
S. Chester	4.0	6.655	0	6.655	12.8
Winfield	1.6	8.674	1.455	10.129	5.8
TOTAL	20.8	47.763	5.428	53.191	52.8

(1) Total Base Gas includes all base gas above and below abandonment pressure.

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DEFINITIONS

In this report, there are several terms used whose meanings are specific to these gas inventory studies. These terms identify portions of the booked gas volume which do not exhibit a pressure response in the reservoir during the semi-annual spring and fall shut-in periods. The terms and their definitions are as follows:

Non-Effective Gas: The volume of gas that does not exhibit a pressure response in the reservoir when a pressure decline analysis (PDA) is performed based on the fall and spring shut-in pressure data which, in general, are not indicative of fully stabilized reservoir conditions. This volume is further broken down into three sub-categories:

- a) **Impounded Gas:** That portion of the non-effective gas which supports the storage cycle under stabilized pressure conditions, but it is not readily producible during the operating withdrawal cycle.
- b) **Non-Recoverable (by AA) Gas:*** That portion of the non-effective gas which supports the storage cycle under stabilized pressure conditions, but cannot be recovered economically upon field abandonment.
- c) **Non-Recoverable (by PDA) Gas:**** That portion of the non-effective gas which no longer supports the storage cycle under stabilized pressure conditions and cannot be recovered.

* Formerly referred to as non-recoverable gas, revised to reflect the methodology used in estimating the volume of gas.

** Formerly referred to as migrated gas, revised to reflect the methodology used in estimating this volume of gas.

December 16, 1989

Non-Effective Gas Calculation

The volume of non-effective gas for an operating cycle is determined graphically by performing a pressure-decline analysis (PDA). The analysis involves measuring the volume of gas withdrawn from a storage field and well shut-in pressures before and after withdrawal takes place. After plotting the starting and ending field balances with the corresponding bottom hole pressures (corrected to amount for the departure from the ideal gas law), a straight line is drawn through the points and extrapolated to zero psia. This line is used to determine the non-effective gas volume for the operating cycle.

The pressure-decline analysis involves the following steps:

- 1) Individual wellhead pressures are recorded during the semi-annual field shut-in periods which take place every spring and fall. If inconsistencies are observed for individual pressures, estimates are made.
- 2) The wellhead pressures are converted to absolute by adding the barometric pressure (14.7 psi).
- 3) These pressures are converted to bottom hole pressures (BHP) by adding the weight of the gas column.
- 4) The compressibility factor (Z) is computed using the properties of the stored gas.
- 5) BHP/Z pressure values are calculated for each well.
- 6) The BHP/Z values are volumetrically weighted to obtain a weighted average field BHP/Z. The volume weighting factors are the product of the acreage assigned to each well and the net pay (gross pay, if net pay is unavailable) thickness of the gas bearing zone.

Non-Effective Gas Calculation - Page 2 OF 2

- 7) The weighted average field pressures are evaluated through the semi-annual shut-in period to establish a stabilization trend. The pressures build-up during the spring and decline during the fall.
- 8) The final spring and fall BHP/Z pressure values are plotted vs. the total field content for those days. A straight line is drawn through the points and extrapolated to zero psia.
- 9) The non-effective gas volume is obtained by subtracting the unpurchased base gas volume from the total gas volume at the abandonment P/Z of the pressure decline curve of the injection/withdrawal cycle.
- 10) Pressure decline lines are plotted for the six most recent consecutive years of operation and are evaluated in terms of continuing or revising the operating mode to improve field performance.

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Non-Recoverable (by PDA) Gas Estimate

The pressure-decline analysis can not be directly applied to estimate the non-recoverable (PDA) gas volume because fully stabilized shut-in pressures are required for such calculations. Pressure stabilization does not usually occur in the storage fields within the scheduled shut-in periods, and longer shut-in periods generally can not be scheduled. Dr. Katz introduced, in 1981, the reservoir size (hydrocarbon pore volume) adjustment concept to directly estimate the volume of non-recoverable (by PDA) gas. This method utilizes the BHP/Z vs. total field content points obtained from the pressure-decline analysis and a reservoir size estimate to determine the non-recoverable (by PDA) gas.

The reservoir size (hydrocarbon pore volume) is the total reservoir volume which can be filled with hydrocarbons, either gas, oil, or both. In a gas storage field, the reservoir size may be larger or smaller than the initial reservoir size, depending upon the history of field operations. If the storage fields are operated at an annual average pressure above the discovery pressure, the reservoir size will tend to increase. If the annual average pressure is below discovery pressure, the reservoir size tends to decrease. These variations are caused by compression or decompression of pore fluids in the rock surrounding the storage reservoir.

Estimating the non-recoverable (by PDA) gas volume involves the following steps (refer to Chart 1):

- 1) The discovery pressure-decline curve is plotted.
- 2) The Final spring (S) and fall (F) BHP/Z pressure values are plotted vs. the total field content at those dates. A line S-F is drawn through these points.

- 3) A reservoir size curve is drawn between the plotted spring and fall points to best represent the current reservoir size. As a rule of thumb, the reservoir size curve separates the pressure points to allow for twice as much spring pressure build-up as fall pressure decline (based on historical observation of reservoir pressure behavior).
- 4) Vertical lines are drawn through the spring and fall pressure points. The Delta BHP/Z between the pressure point and the reservoir size curve is recorded for fall and spring.
- 5) A comparison is made between the Delta BHP/Z's observed during the semi-annual field shut-in periods and those obtained above.
- 6) If comparison is good, then the estimate of the current reservoir size is considered correct and there is zero non-recoverable (by PDA) gas.
 - a) If excessive pressure stabilization (beyond observed psi/day changes) is required to produce agreement with the reservoir size curve, there is evidence that a portion of the book content may no longer support the storage cycle.
 - b) The S-F curve is shifted to the left until a smaller expanded reservoir size can be drawn between the pressure points to properly reflect the observed pressure stabilization.
 - c) The distance (volume on the X-axis) between the original S-F line and the shifted S-F line represents the non-recoverable (by PDA) gas volume.

The procedure described above was performed for the storage fields in the early 1980's. While the procedure is not rigorously performed annually, the recent and current cycles (fall and spring P/Z and content) are reviewed and compared to those of the early 1980's. Based on the comparison of recent relationships of weighted average P/Z to total field content to those of the early 1980's, a recommendation is made to change or retain the "non-recoverable by PDA" volume.

Further supporting this annual review and judgment, observation wells on the outer edges of the storage fields are monitored to verify the location of stored gas. Neutron logging is reviewed to monitor potential gas movement to permeable zones above and below the storage formation. Bottom hole pressure surveys are utilized to directly determine bottom hole pressures. Gas analyses are run on observation wells to identify stored pipeline gas.

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Non-Recoverable (by AA) Gas Calculation

Gas that is categorized as non-recoverable from an economic standpoint was determined by performing an abandonment analysis (AA). An abandonment analysis consists of simulating continued gas withdrawals at declining flow rates using the deliverability data obtained during normal storage operations. At the start of the abandonment analysis, the booked content of gas is reduced by the estimated non-recoverable (by PDA) gas volume. Throughout the abandonment process, the field may be alternately shut-in and produced to allow gas at the periphery to move to the heart of the field. This process is continued until production rates fall below a pre-determined economic limit. The volume of gas remaining in the reservoir is the non-recoverable (by AA) gas. Messrs. Katz, Elengaas, and Vary assumed an economic field rate of 800-1,000 Mcf/D as a basis for the abandonment studies performed in 1981.

December 16, 1999

TOTAL FIELD CONTENT - BOF

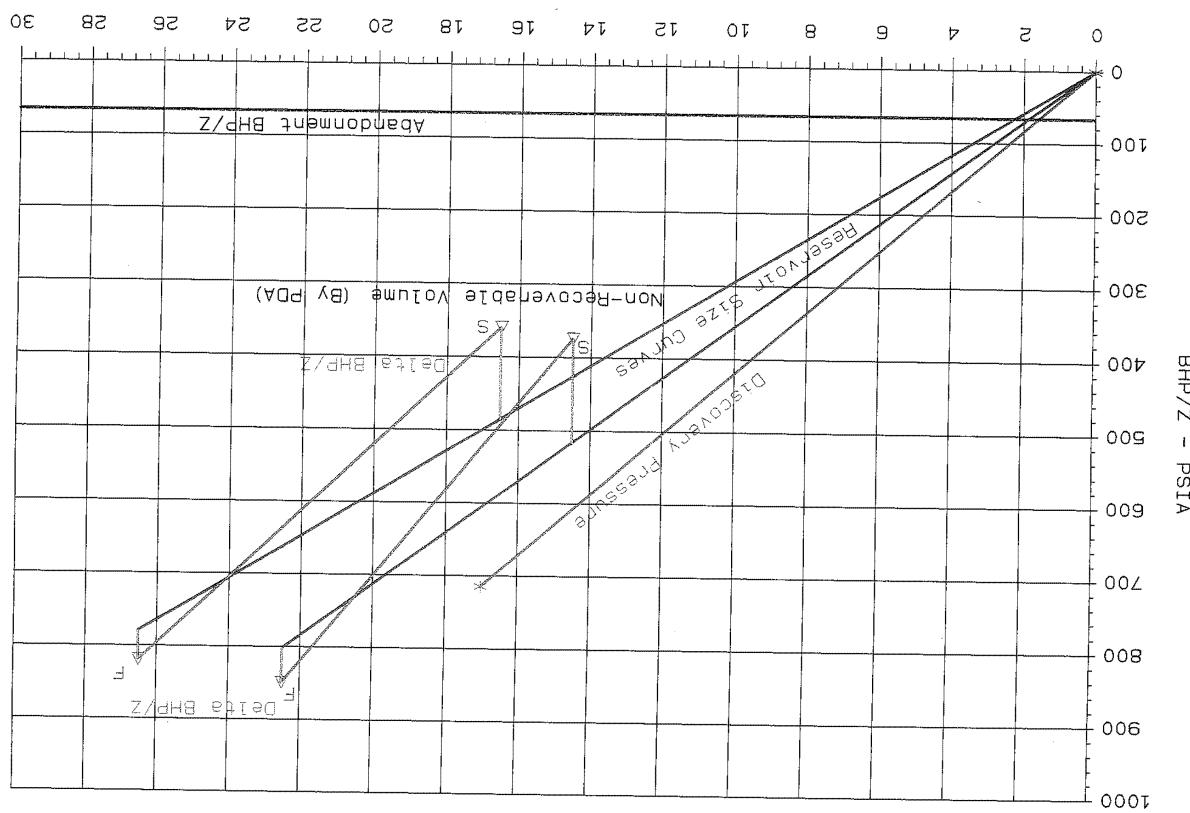


CHART 1. NON RECOVERABLE (BY PDA) GAS VOLUME PLOT

MUTTONVILLE**EXECUTIVE SUMMARY**

Muttonville gas storage field met all operating demands for 1998 and 1999. Due to the nature of the TransCanada contract storage service provided from Muttonville, traditional cycles are not available for inventory evaluation. Withdrawals of 2.9 Bcf from Muttonville occurred from December through July with withdrawal activity in each month except February and April. Injections of 6.4 Bcf occurred from May, 1998 through July, 1999 with only September, January, February and July not showing injection activity. After 1998 injections, the Muttonville storage field inventory has remained above 9.6 Bcf working gas and 1,390 psi keywell pressure throughout 1999. No spring, 1999 shut-in was completed.

Inventory volume is estimated using keywell pressure converted to bottom hole P/Z at various field contents during 1998 and 1999. Non-effective gas is calculated using the fall, 1998 maximum inventory and the minimum inventory reached in March, 1999. The material balance of keywell bottom hole P/Z versus inventory extrapolates to 0.238 Bcf, which is less than 2% of the maximum fall inventory. This non-effective gas volume is consistent with annual volumes determined throughout the historical operation of Muttonville.

1998-1999 STORAGE CYCLE

The Muttonville Gas Storage Field has been contracted to provide gas storage to TransCanada Pipeline. Storage injections and withdrawals now result from pipeline and compressor maintenance in addition to extreme weather conditions both summer and winter. Muttonville serves as a peaking field with injections and withdrawals occurring within each month as needed. Maximum field content was reached in the

fall, 1998 at 11.1 Bcf and 1,540 psig keywell wellhead pressure. The lowest field content achieved during January-July, 1999 was 9.7 Bcf and 1,400 psig keywell wellhead pressure. Total injections for May and November were 4.5 Bcf. Total withdrawals for December, 1998 and March, 1999 were 1.4 Bcf.

The non-effective gas volume for the 1998-99 operating cycle is 238 MMcf, within the normal range for Muttonville and below the previous 22 year average non-effective gas of 392 MMcf. The field was shut-in for 4 days in the fall, 1998 and was not shut-in for spring, 1999 due to contractual obligations. The fall, 1998 gas characteristics were: gravity = .582, N₂ = 1.55 mol. pct, CO₂ = .78 mol. pct., T_c = 348.6 °R, and P_c = 669.1 psia (gas sample taken September 9, 1998). On November 6, the weighted average pressure was 1,548.5 psig wellhead, 1,675.8 psia bottom hole and 2,061.5 psia BHP/Z, with a standard deviation of 2.0 psi from mean wellhead pressure. Map 2 shows the final shut-in pressures for fall, 1998. Muttonville continued to have no injection or withdrawal for 50 days of field shut-in to December 21. On December 21, the Fawver 1 keywell pressure was 1,540.9 psig wellhead, 1,667.6 psia bottom hole and 2,050.0 psia BHP/Z. Map 3 shows the automated wellhead pressures on December 21 with all wells other than the Fawver open to the header.

Spring, 1999 shut-in for Muttonville is a 21 day period of no activity from March 9 through March 30. On March 30, the Fawver 1 keywell pressure was 1,397.0 psig wellhead, 1,511.7 psia bottom hole and 1,833.8 psia BHP/Z. The spring, 1999 gas characteristics were: gravity = .583, N₂ = 1.57 mol. pct, CO₂ = .81 mol. pct., T_c = 348.5 °R, and P_c = 669.2 psia (gas sample taken December 9, 1998). Map 4

shows the automated wellhead pressures on March 30 with all wells other than the Fawver 1 open to the header.

The non-effective gas volume calculation used for 1998-99 was compared to the past five withdrawal cycles using only the Fawver 1 pressure for each shut-in to calculate BHP/Z from keywell pressure. Table 1 lists the data and the calculated non-effective gas volumes for each cycle. The BHP/Z versus Content plot shows the past four cycles using weighted average BHP/Z rather than calculated BHP/Z from keywell pressure. A second plot also shows five shut-in data points from December 21 through August 31 when the field was idle for at least six days. These points confirm the 1998-1999 BHP/Z versus content relationship to past withdrawal cycles.

DATE	BHP/Z PSIA	WORKING GAS MMcf	TOTAL CONTENT MMcf	NON-EFFECTIVE GAS MMcf	PRODUCTION PER POUND Mcfd/psi
10/28/93	2,071.9	11,121	13,435		
04/08/94	1,649.9	8,289	10,603	-469	6,711
12/07/94	2,052.8	11,127	13,441		
04/28/95	1,531.5	7,663	9,977	-200	6,645
12/07/95	2,045.7	11,114	13,428		
03/21/96	941.5	4,387	6,701	965	6,092
12/13/96	2,052.0	11,126	13,440		
05/21/97	1,291.4	6,123	8,437	-57	6,578
12/22/97	2,006.8	10,764	13,078		
05/01/98	1,372.6	6,621	8,935	-32	6,533
12/21/98	2,060.0	11,064	13,378		
03/30/99	1,833.8	9,678	11,992	238	6,410

MUTTONVILLE - PAGE 4 OF 4**SUMMARY**

Muttonville operations do not appear to have any direct impact outside the reservoir. Annulus pressure monitoring and casing inspection logs do not indicate any identifiable leaks from the Muttonville reservoir. The Muttonville 13 test well continues to show no annulus pressure. The Pilat #1-24 remains shut-in with no connection to a pipeline, which is not in compliance with the Michigan Department of Environmental Quality regulations. No additional bottom hole pressure tests on the Pilat became available in 1998-1999, but a copy of a gas analysis by Isotech Laboratories in 1997 was received through the Michigan Public Service Commission. The results of the analysis were similar to samples analyzed from 1994-1997.

CONCLUSION

All inventory is verified using average pressure techniques. Muttonville exhibits a consistent year to year operation. All booked gas volumes continue to be recoverable.

Base gas volume for Muttonville was increased by 2.9 Bcf from 2.314 Bcf to 5.214 Bcf on March 31, 1999. The pressure versus content plot (hysteresis loop) has been prepared using the revised base gas volumes.

December 7, 1999

HISTORICAL GAS SAMPLE ANALYSIS - MUTTONVILLE STORAGE FIELD

LOCATION	SAMPLE DATE	GRAVITY	% N ₂	% CO ₂	C ₁ /C ₂	C ₁ /C ₃
<u>Native Gas</u>						
Fawver 1	10/67	0.651	2.38	0.21	18.2	39
Kethe 1	02/68	0.641	2.15	0.11	18.7	39
Fawver 2	02/68	0.638	2.51	0.08	19.3	41
Kethe-Claagett 1	12/70	0.647	2.30	0.04	18.7	40
<u>Withdrawal Gas</u>						
	02/78	0.594	1.51	0.39	28.3	236
	02/81	0.579	1.99	0.37	51.3	477
	02/86	0.587	1.87	0.54	39.8	297
	03/87	0.577	1.36	0.49	56.4	563
	02/88	0.586	1.68	0.52	45.5	307
	02/89	0.582	1.60	0.56	50.0	384
	02/90	0.585	1.72	0.54	42.3	317
	01/91	0.586	1.98	0.68	40.1	327
	02/93	0.585	1.70	0.68	37.8	349
	02/94	0.588	1.64	0.78	36.0	299
	02/95	0.587	1.74	0.77	36.3	320
	02/96	0.590	1.67	0.73	37.0	255
	02/97	0.586	1.65	0.80	34.8	348
	03/98	0.586	1.71	0.77	37.3	416
	05/99	0.584	1.59	0.83	38.8	372
<u>Injection Gas</u>						
	07/86	0.575	1.58	0.48	61.4	852
	09/87	0.577	1.47	0.53	57.8	727
	09/88	0.578	1.65	0.49	57.6	519
	08/89	0.580	1.98	0.51	53.3	506
	09/90	0.585	1.93	0.64	38.1	451
	08/91	0.584	1.85	0.68	45.6	372
	09/92	0.582	1.70	0.70	42.1	500
	08/93	0.586	1.65	0.73	36.0	319
	07/94	0.588	1.74	0.76	34.8	306
	08/95	0.587	1.79	0.78	35.7	354
	09/96	0.585	1.70	0.79	37.4	452
	10/97	0.583	1.68	0.79	38.4	697
	06/98	0.583	1.66	0.79	36.5	730

June 22, 1999

MUTTONVILLE FIELD		
INITIAL FIELD CONTENT; TOTAL PRODUCTION; NATIVE, INJECTED BASE AND TOTAL BASE GAS AND WORKING STORAGE CAPACITY		
VOLUMES IN Mcf	PRESSURES ARE WELLHEAD, PSIG	
	PRESSURE BASE 15,025 PSIA	PRESSURE BASE 14,730 PSIA
1. Initial Field Content	10,505,000	10,715,100
2. Metered Production to 07/01/75	8,896,647	9,074,580
3. Native Gas Field Content 07/01/75	1,608,353	1,640,520
4. Less deliveries made to MichCon	(1,413,820)	(1,441,824)
5. Adjusted Native Gas Field Content	194,820	198,776
6. Injected Base Gas	2,073,510	2,114,981
7. Total Base Gas 0-300 psig	2,268,330	2,313,697
8. Working Storage Capacity 300-1,575 psig		11,100,000

1. Initial Field Content was determined from the pressure-production decline curve corrected for gas compressibility.
2. Metered Production to 07/01/75 is the sum of the metered production from each well from discovery to 07/01/75.
3. Native Gas Field Content on 07/01/75 is the subtraction of line 2 from line 1.
4. When the Muttonville field was acquired, Michigan Consolidated Gas Company had a call on the native gas in the field which they subsequently purchased from MW, who had acquired the gas from the producer and land owners.
5. The adjusted native gas field content is the subtraction of line 4 from line 3.
6. The injected base gas was determined from the pressure-production decline curve corrected for gas compressibility to attain 300 psig wellhead base pressure.
7. Total Base Gas is the summation of lines 5 and 6.

September 16, 1998

MUTTONVILLE FIELD**BASIC INFORMATION**

Discovery Date: September 19, 1966
(Fawver 1, PN 26437)
NW NE SW 13-4n-14E

Converted to Storage: 1975

Discovery Pressure: 1,217 psig wellhead
1,331 psia bottom hole
1,675.2 psia BHP/Z

Temperature: 76° F bottom hole
55° F average annual surface

Average Pay Thickness: 270'

Depths:

Traverse Limestone:	771'
Dundee:	1,031'
Bass Islands:	1,615'
Brown Niagaran:	2,598'
Mid Reef Datum:	2,700'
Grey Niagaran:	2,868'

Initial Gas in Place to 0 psig: 10,715,100 Mcf
(Using Pressure Decline Analysis)

Original Pore Volume: 100,104,500 FT³

Total Production Prior to Storage: 9,074,580 Mcf

Base Gas (from 0-300) psig: 2,313,697 Mcf

Practical Working Gas Capacity: 11,100,000 Mcf

Maximum Operating Wellhead Pressure: 1,575 psig

Minimum Operating Wellhead Pressure: 300 psig

Estimated Abandonment Pressure: 0 psig

BASIC INFORMATION - MUTTONVILLE FIELD - PAGE 2 OF 2

Native Gas:

Specific Gravity = 0.650
(Using 1967 Gas Sample)
mol. % N₂ = 2.30
mol. % CO₂ = 0.18

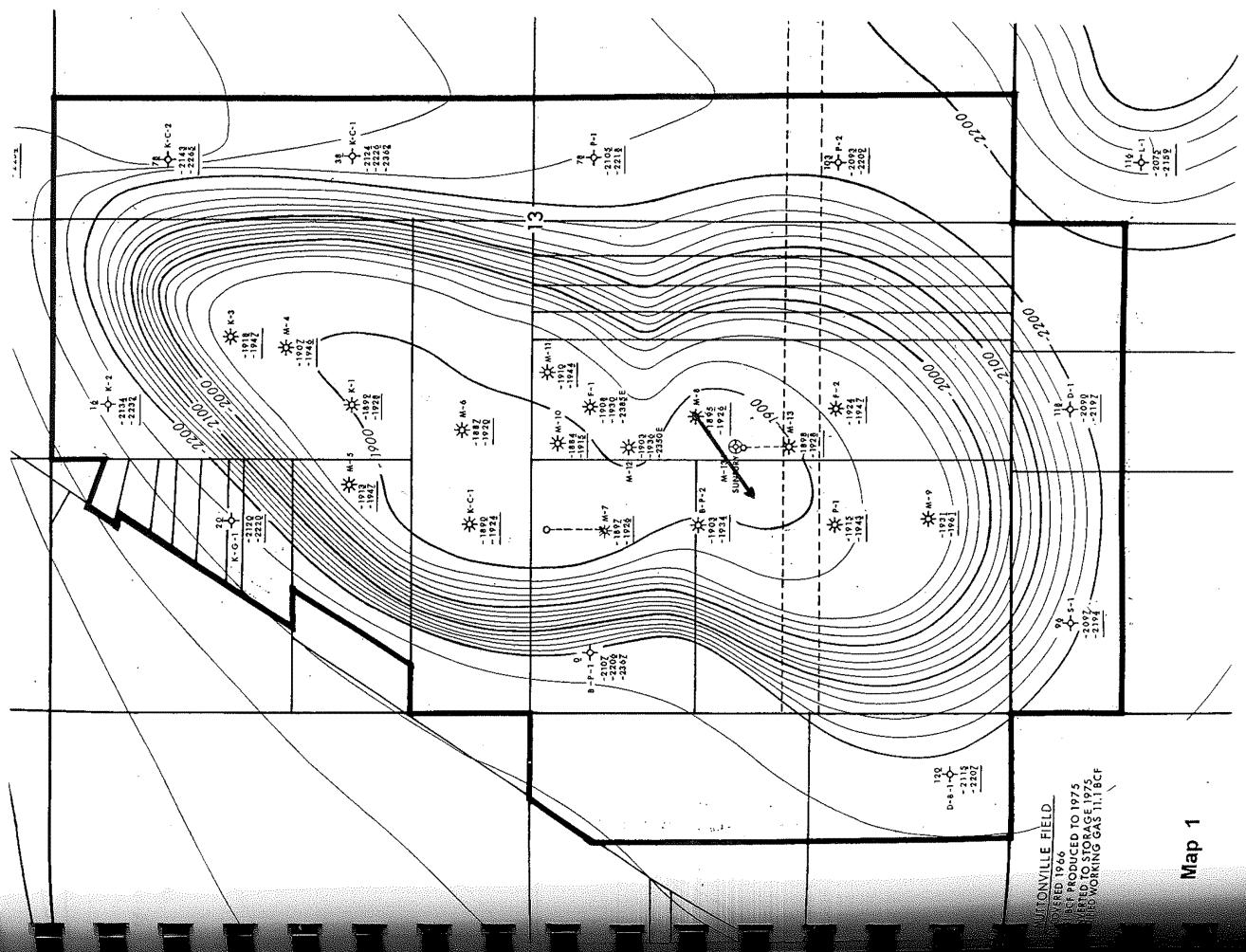
All Volumes Reported at 14.73 psia

December 8, 1999

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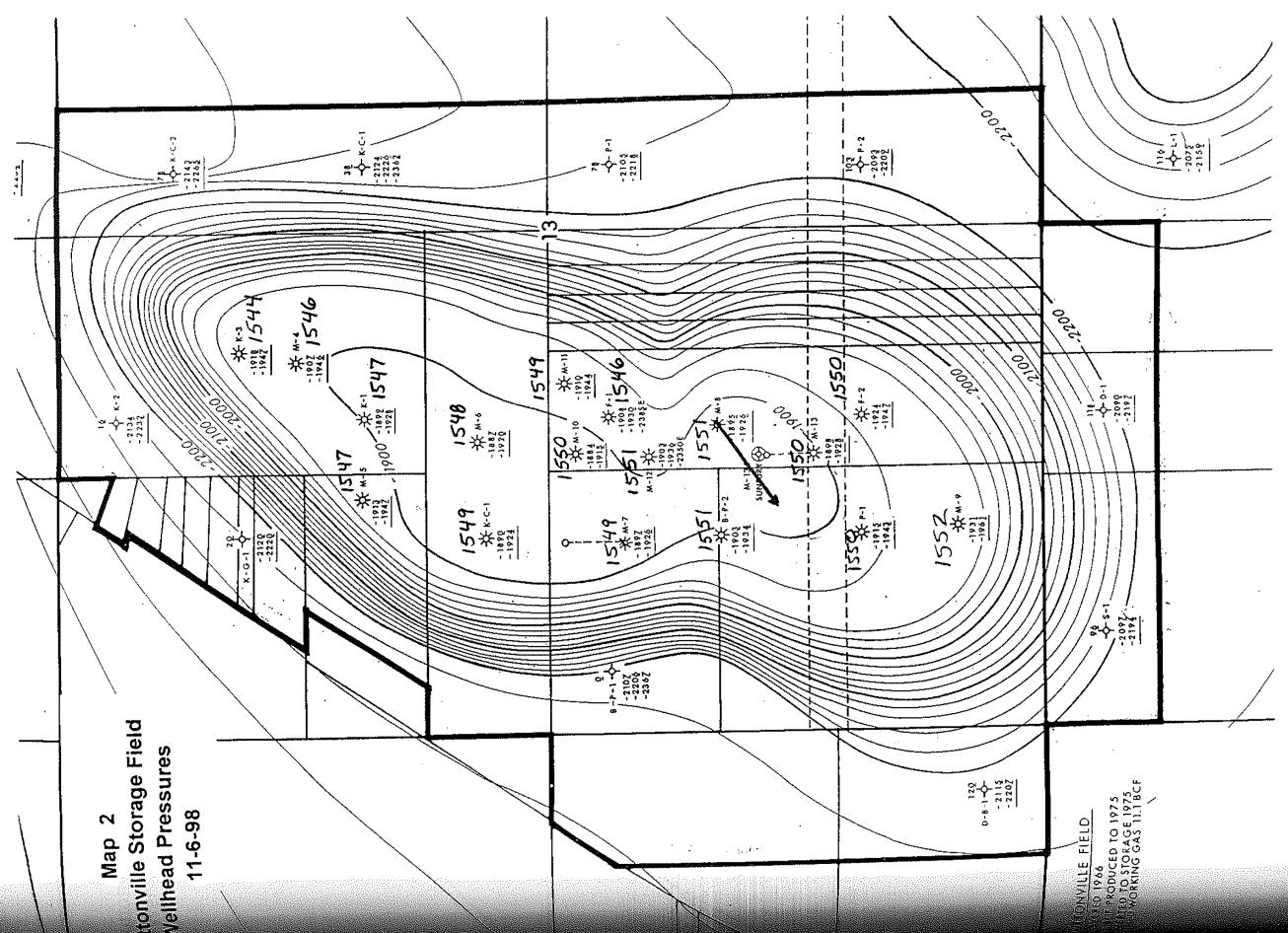
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Map 1

WITTONVILLE FIELD
COVERED 1966
BCF PRODUCED TO 1975
SHUTTED TO STORAGE 1975
LINED WORKING GAS 11.1 BCF

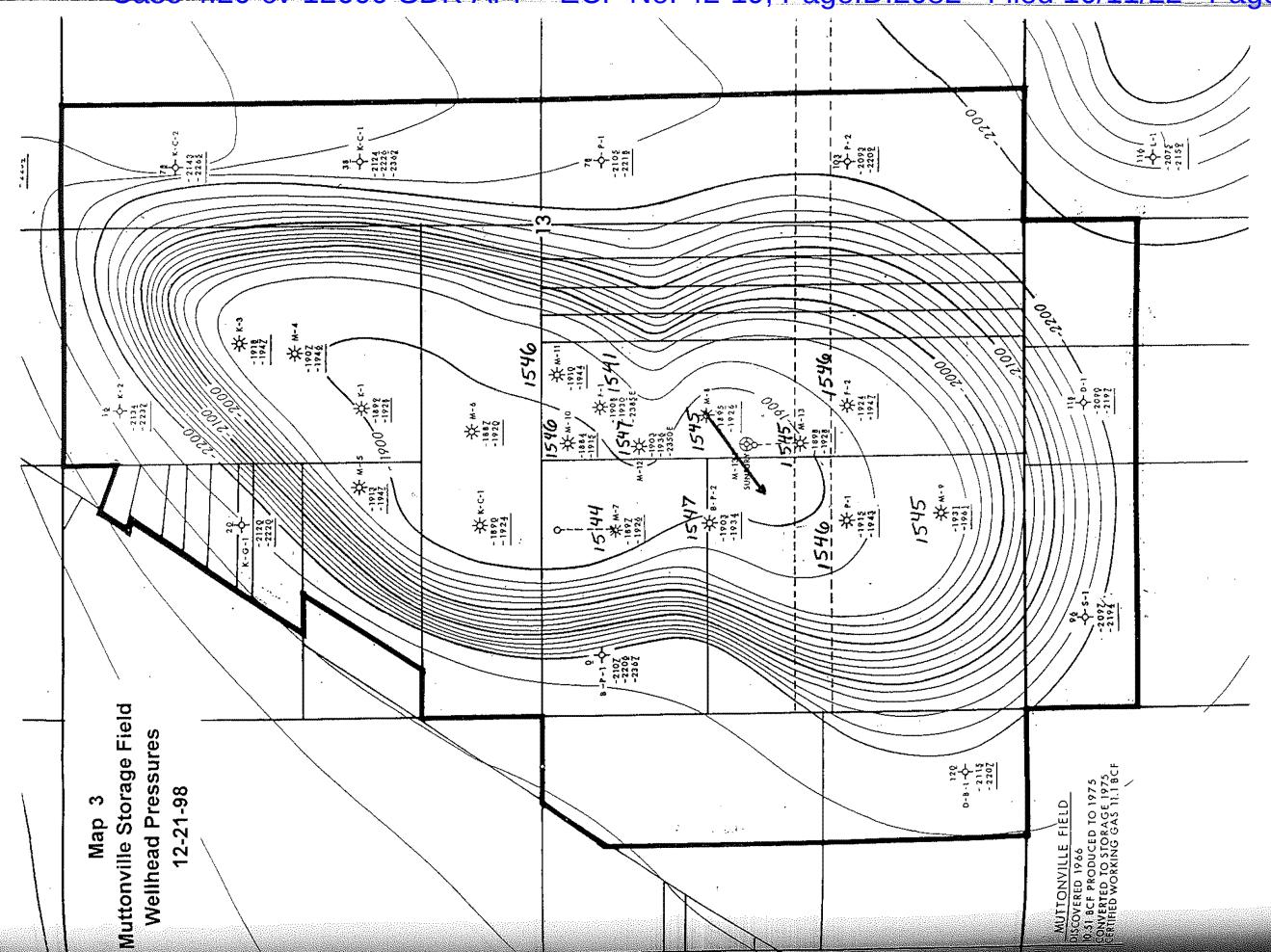
Map 2
Muttonville Storage Field
Wellhead Pressures
11-6-98



MUTTONVILLE FIELD

1964
PRODUCED TO 1975
ADDED TO STORAGE FIELD
WORKING GAS 1100cf

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MUTTONVILLE FIELD
DISCOVERED 1966
10.31 BCF PRODUCED TO 1975
CONVERTED TO STORAGE 1975
CERTIFIED WORKING GAS 11.18

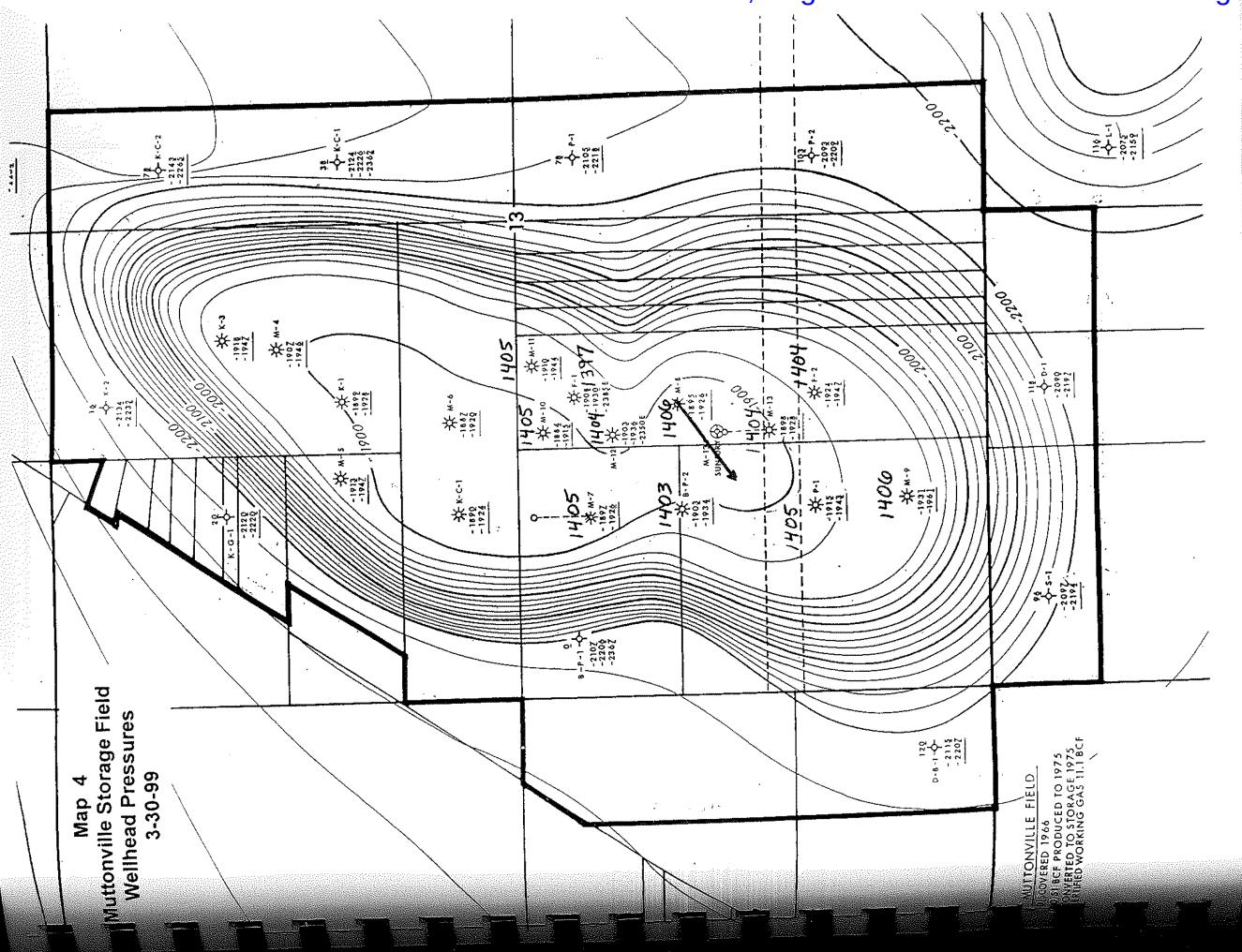
Map 3
Muttonville Storage Field
Wellhead Pressures
12-21-98

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Map 4
Lintonville Storage Field
Wellhead Pressures
3.30-99



HUTTONVILLE FIELD
DISCOVERED 1966
180 BCF PRODUCED TO 1977
CONVERTED TO STORAGE 1977
CAPTURED WORKING GAS 11.1

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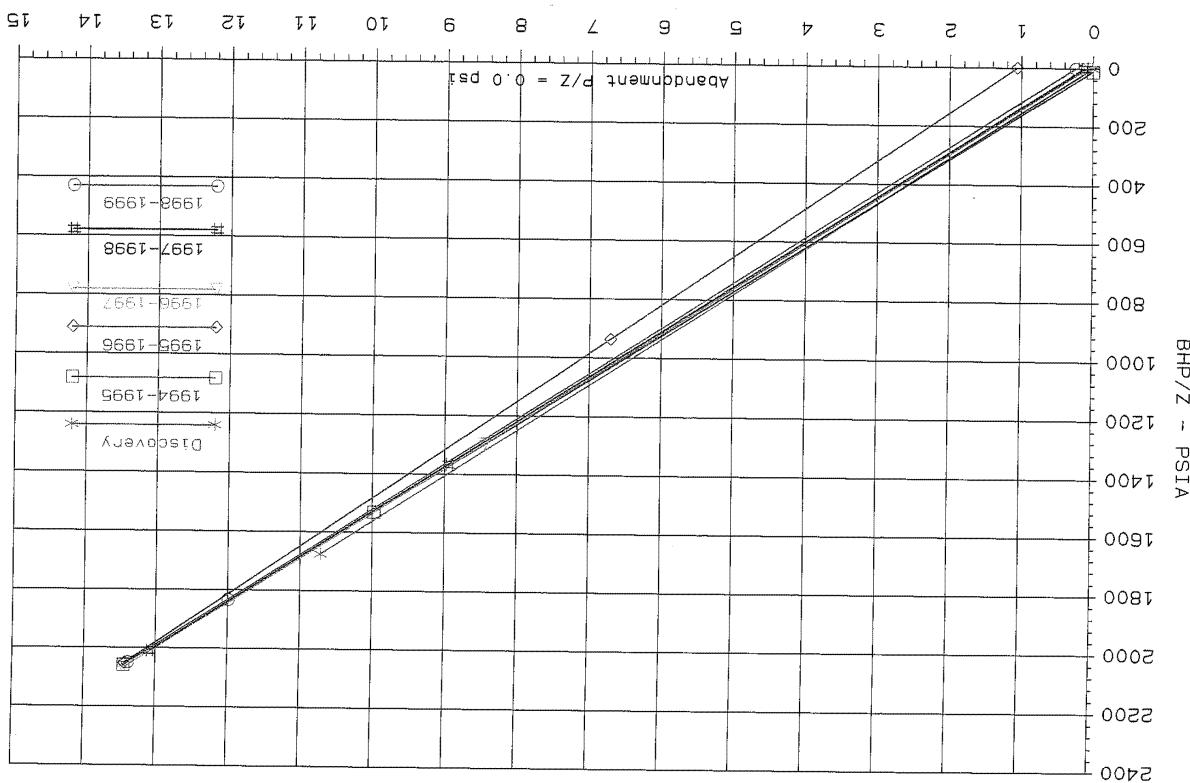
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Multiwell Storage Field											
END DATE	SHUT-IN	DAYS OF PRESSURE	WELL HEAD PRESSURE (PSIA)	BOTTOM HOLE PRESSURE (PSIA)	BOOK FIELD TOTAL FIELD	WEIGHTED AVG	WEIGHTED AVG	WEIGHTED AVG	HISTORICAL NON-EFFECTIVE GAS VOLUME	ANR PIPELINE COMPANY	NON-EFFECTIVE PRODUCTIVE GAS VOLUME (MCF/D)
03/30/99	21	1,397.0	1,511.7	1,833.8	11,992	11,992	11,992	11,992			6,410
12/21/98	49	1,540.9	1,667.6	2,050.0	13,378	13,378	13,378	13,378			6,451
05/01/98	39	1,706.9	1,166.3	1,367.0	13,078	13,078	13,078	13,078			6,451
12/22/97	63	1,513.8	1,638.2	2,009.2	13,078	13,078	13,078	13,078			6,451
04/28/95	10	1,189.6	1,669.8	2,053.2	832.6	832.6	832.6	832.6	6,701	1,056	6,026
12/07/95	71	1,526.2	1,691.3	2,069.0	13,440	13,440	13,440	13,440	8,437	79	6,458
12/07/94	47	1,553.4	1,111.6	1,294.3	8,437	8,437	8,437	8,437	13,441	1,056	6,026
04/08/94	3	1,273.9	1,379.3	2,059.1	2,059.1	2,059.1	2,059.1	2,059.1	1,670.0	10,603	434
04/08/92	8	1,553.4	1,680.7	2,074.5	13,394	13,394	13,394	13,394	8,010	746	6,097
04/01/91	12	1,261.2	1,366.6	2,036.2	13,434	13,434	13,434	13,434	10,637	-96	6,571
04/13/92	41	1,552.1	1,680.7	2,074.5	13,394	13,394	13,394	13,394	8,010	746	6,097
04/11/90	73	1,547.5	1,675.0	2,060.9	13,446	13,446	13,446	13,446	1,282.2	1,056	6,515
04/11/88	14	1,146.6	1,664.9	2,036.2	13,331	13,331	13,331	13,331	1,056	1,350	5,941
04/07/87	86	1,538.3	1,663.1	2,033.7	13,433	13,433	13,433	13,433	1,672.7	1,056	5,731
04/07/86	14	1,117.3	1,209.2	1,419.1	13,198	13,198	13,198	13,198	1,419.1	1,121.2	6,545
04/07/85	70	1,525.6	1,653.1	2,036.1	13,323	13,323	13,323	13,323	1,653.1	1,121.2	6,589
11/18/85	37	1,117.3	1,209.2	1,419.1	13,198	13,198	13,198	13,198	1,427.4	9,353	-52
05/09/85	134	1,505.8	1,630.3	1,997.2	13,108	13,108	13,108	13,108	1,505.8	1,121.2	6,589

Muttonville Storage Field

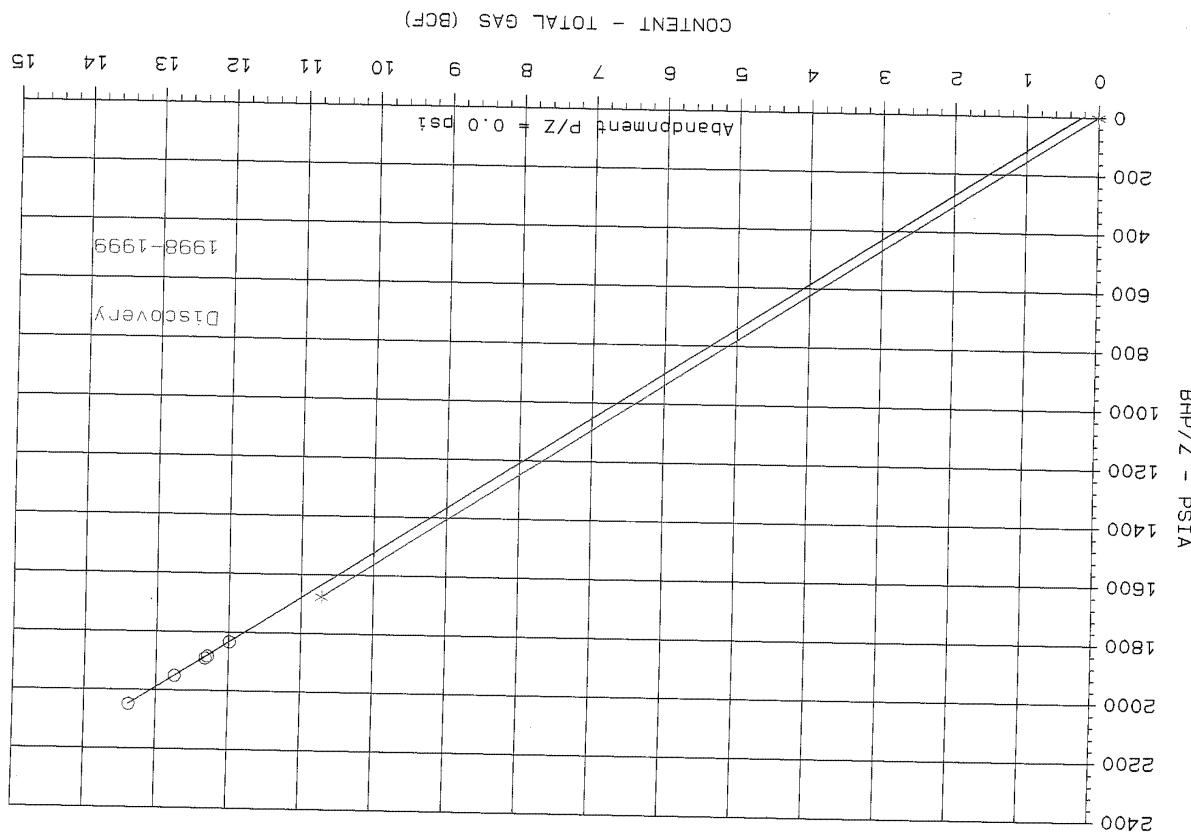
ANR PIPELINE COMPANY HISTORICAL NON-EFFECTIVE GAS VOLUME

CONTENT - TOTAL GAS (BCF)



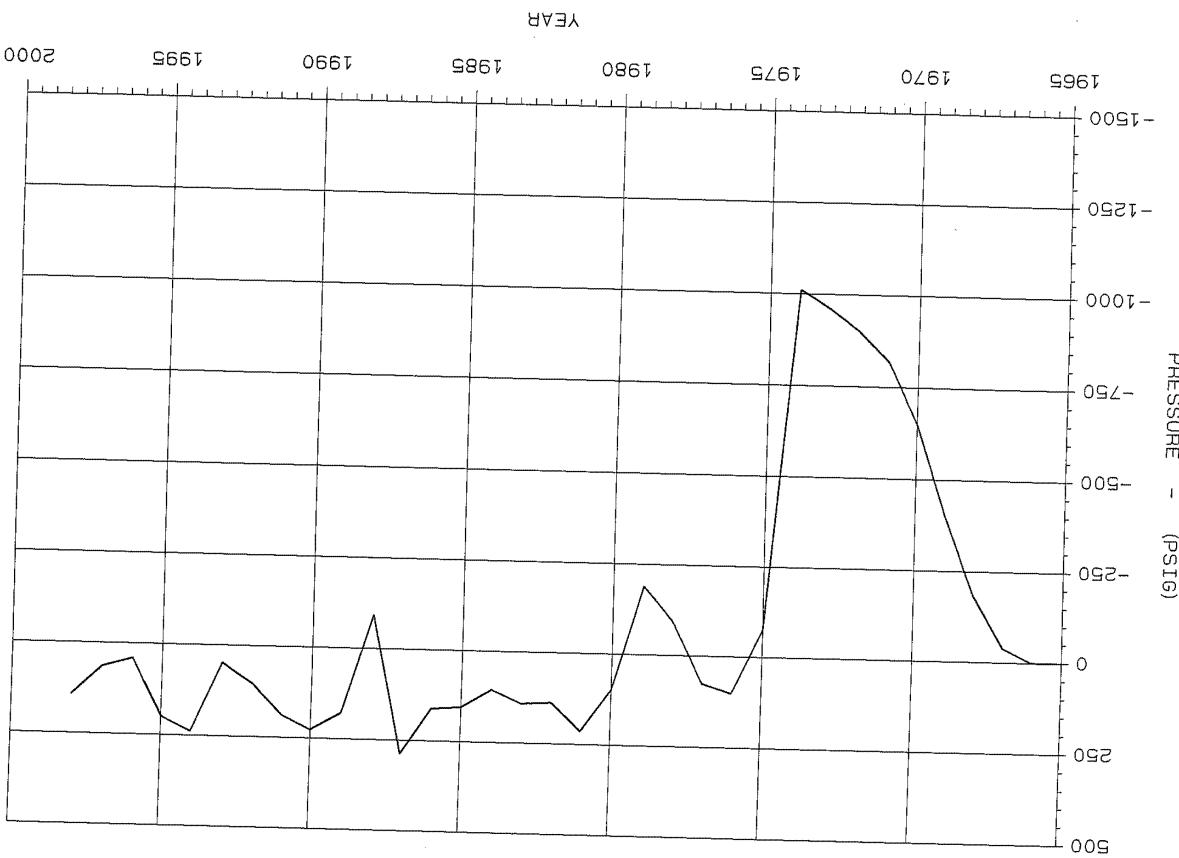
BHP/Z vs CONTENT

MULTONVILLE STORAGE FIELD



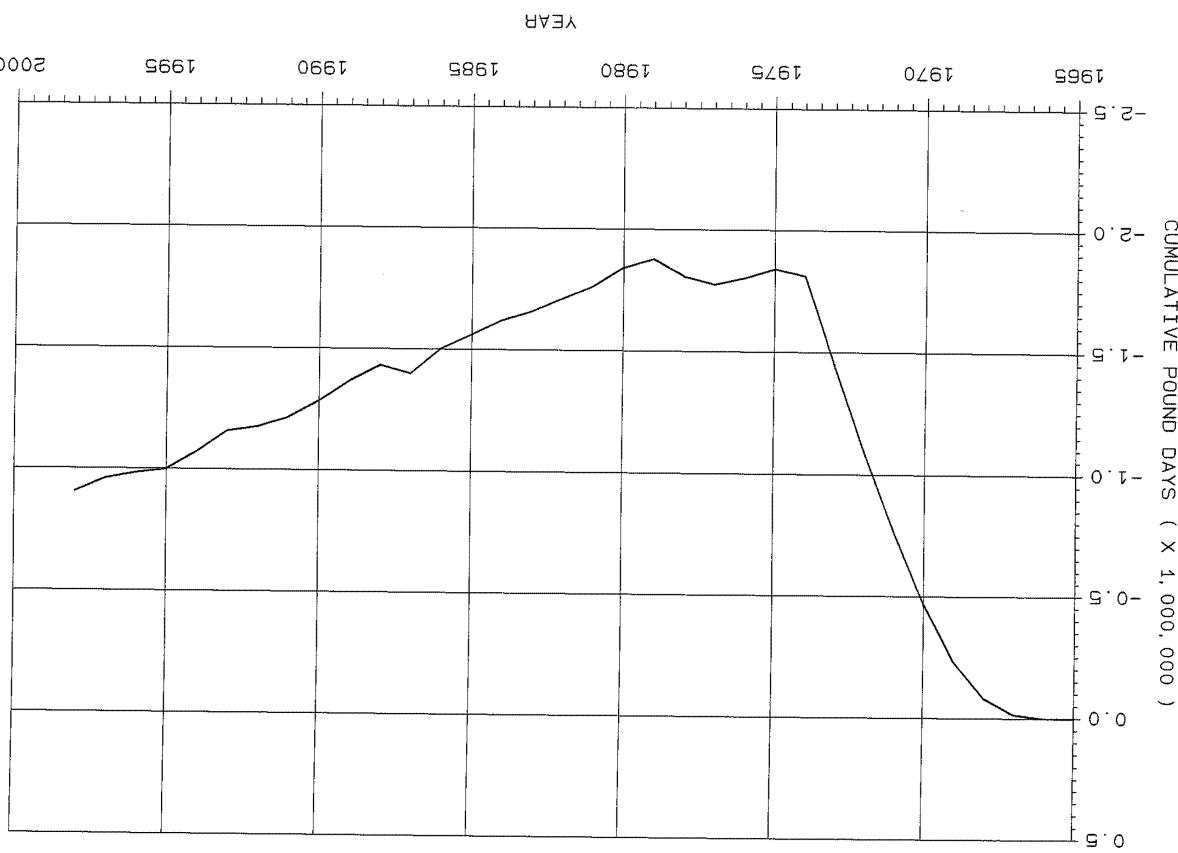
BHP/Z VS CONTENT

MULTONVILLE STORAGE FIELD

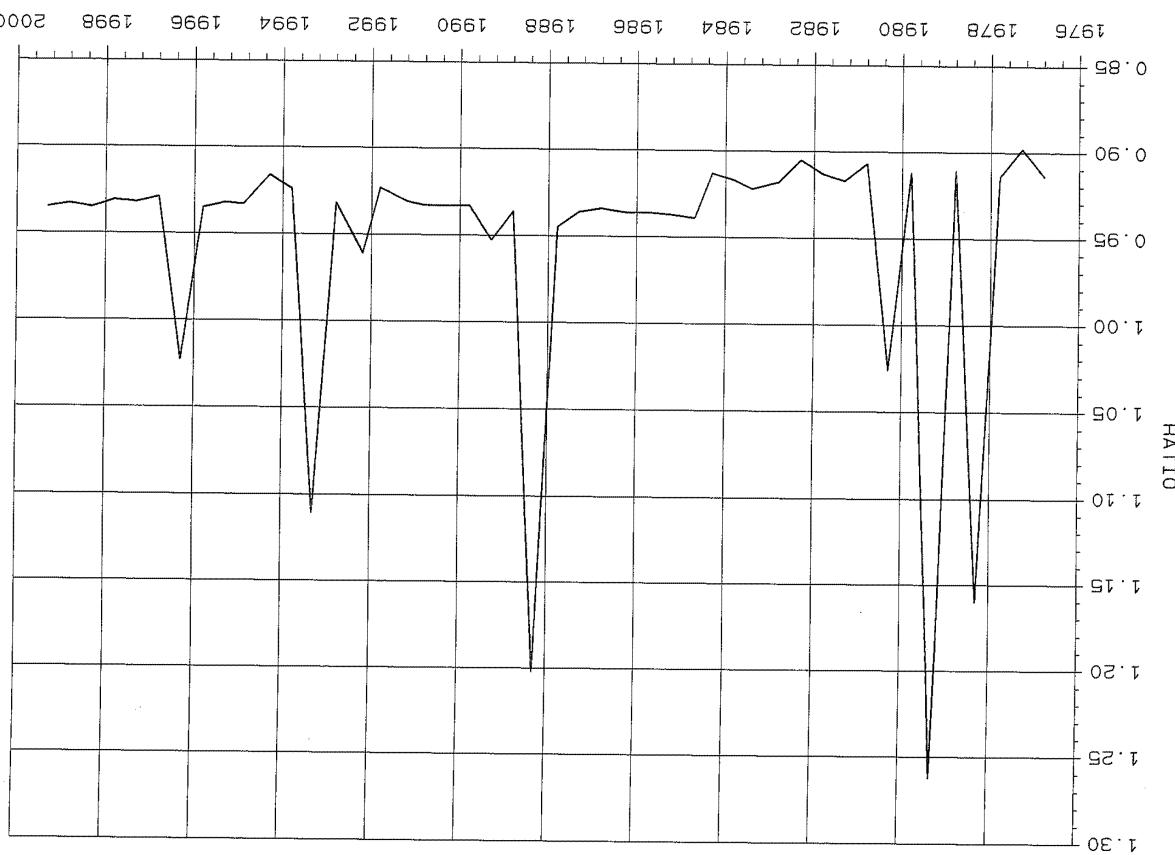


MULTONVILLE STORAGE FIELD

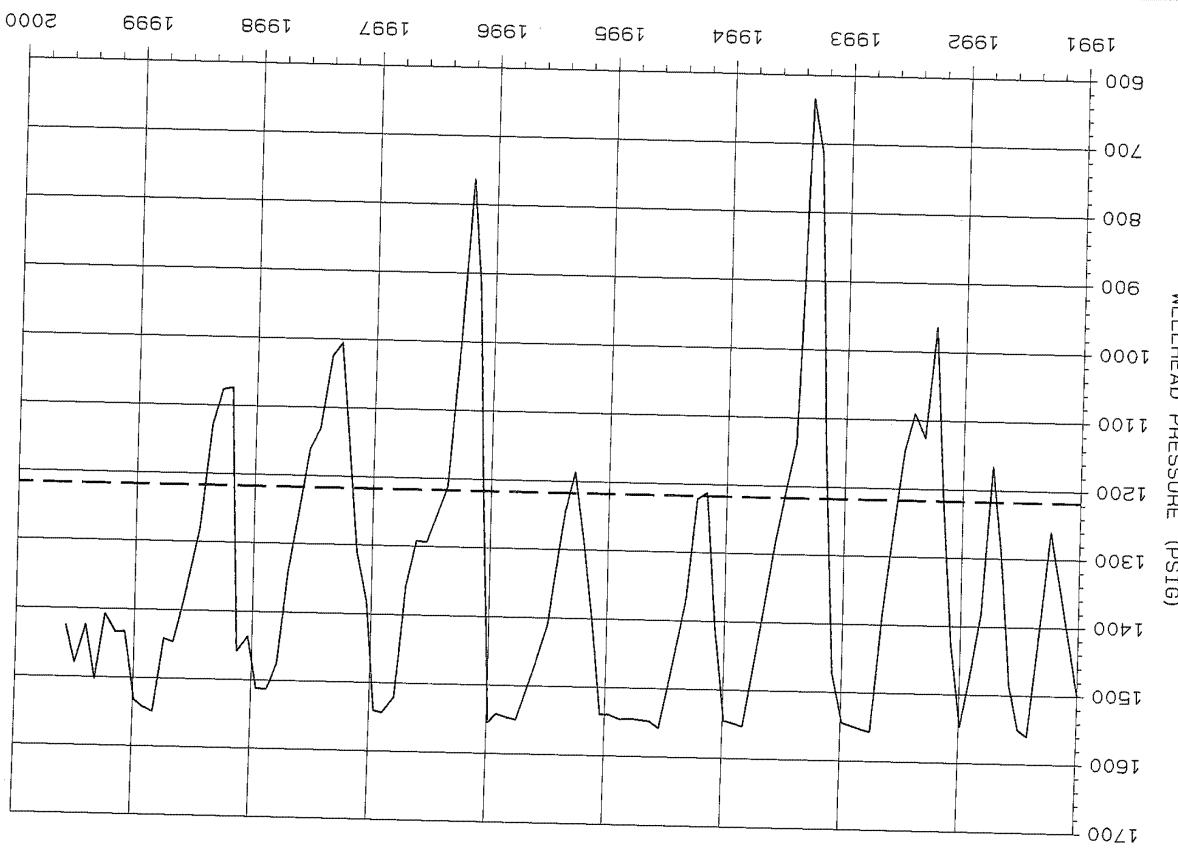
AVERAGE KEYWELL ABOVE DISCOVERY



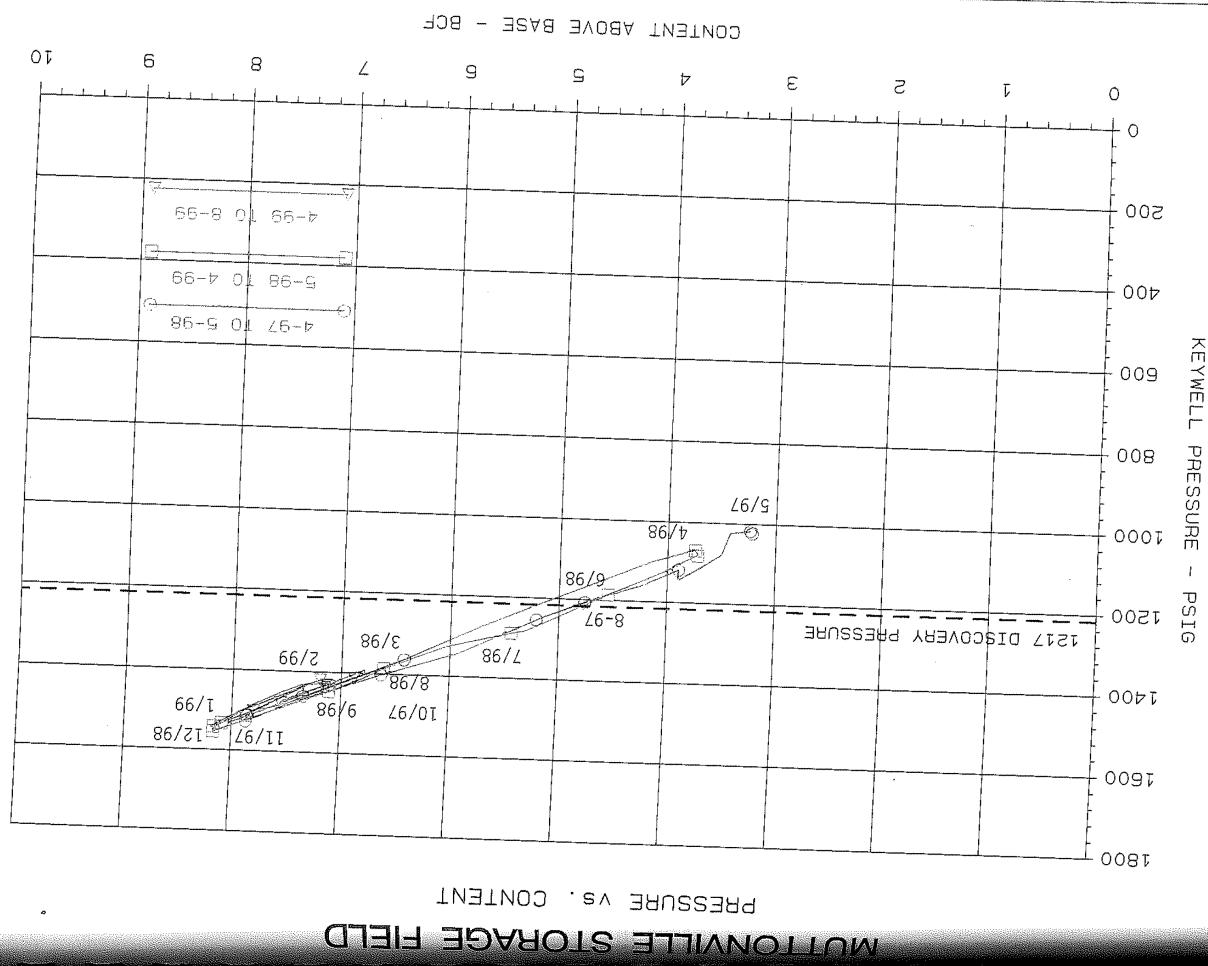
MULTONVILLE STORAGE FIELD
CUMULATIVE HISTORY OF POUND-DAYS



MULTI-LEVEL STORAGE FIELD
PORE VOLUME RATIO - SHOT IN VS ORIGINAL



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